THE USE OF BROKERED DEPOSITS AND ITS RELATION TO BANK FAILURE: THE CASE OF INDUSTRIAL BANKS

by

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A thesis submitted to the faculty of the
The University of Utah
in partial fulfillment of the requirements for the degree of

Master of Science

Department of Economics

The University of Utah

May 2013

The University of Utah Graduate School

STATEMENT OF THESIS APPROVAL

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ABSTRACT

As a result of the Great Recession of 2007-2009, the financial services industry came under intense government scrutiny that resulted in the Dodd–Frank Wall Street Reform and Consumer Protection Act of 2010 (Dodd-Frank). As part of Dodd-Frank, the Federal Deposit Insurance Corporation (FDIC) was required to conduct a study on the use of brokered deposits and its effect on insurance premiums to be completed by July 2011. Across the banking sector, industrial banks are the primary users of brokered deposits and yet no industrial banks failed during the Great Recession. This thesis reviews the literature on industrial banks to help explain how this group of banks endured the effects of the Great Recession. A select data set from FDIC Call Reports will show how the existing regulation of brokered deposits provided the correct incentives to deter moral hazard issues that cause bank failures.

A los amores de mi vida: Esperanza y Darien.

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ACKNOWLEDGEMENTS

It has been ten years since I first met my wife, Esperanza. I would not have been able to finish this thesis without her support. I would like to thank her for reviewing many papers and, particularly, this thesis. Her companionship, support, and devotion during all these years have been an incalculable source of strength and happiness. I would like to thank my parents, Ada and Gustavo Reyes for giving me the opportunity to study in the United States. Their discipline and vision gave me a better quality of life and I thank them. My belief in the value of education is rooted in the example that they set for me. I would also like to give special thanks to my boss, Dawn Cannon for supporting me with ideas, data, encouragement, and especially work hour flexibility during the process of writing this thesis. As an employee of EnerBank USA, an industrial bank, I had the opportunity to learn first-hand about this industry. I would also like to acknowledge the support of my committee members for providing honest feedback during my thesis defense. In particular, I would like to thank Dr. Codrina Rada for being an outstanding mentor for the past few years, and an excellent chair. I would also like to acknowledge the efforts of all of the professors in the Economics Department that teach night classes. Without their participation and eagerness to teach, I would have been deprived of the opportunity to enhance my knowledge of the fascinating subject of economics.

1. INTRODUCTION

As the Great Recession of 2007-2009 progressed[1], the United States economy experienced a drop in overall economic activity in terms of GDP, employment, housing prices, and industrial production, among other sectors. Given that it was the longest recession since World War II, the recovery process has also taken longer than usual. It is not surprising that the alarming increase in the number of bank failures during the Great Recession captured the attention of the public in general, as it affected depositors, investors and, ultimately, the overall health of the economy. According to the Federal Deposit Insurance Corporation (FDIC)[2], a total of 434 banks failed between 2007 and 2012. As shown in Table 1, only three banks failed in 2007, but the number of bank failures increased exponentially each following year until a peak of 157 bank failures was reached in 2010[3], even though the Great Recession officially ended in 2009.

[1] The National Bureau of Economic Research provides the start and end dates of recessions in the United States. The official release for the Great Recession can be located at: http://www.nber.org/cycles/sept2010.html

[2] The Federal Deposit Insurance Corporation preserves and promotes public confidence in the U.S. financial system by insuring depositors for at least $250,000 per insured bank; by identifying, monitoring and addressing risks to the deposit insurance funds; and by limiting the effect on the economy and the financial system when a bank or thrift institution fails. For more information, visit: http://www.fdic.gov/about/affaq.html

[3] The list of failed banks since October 1, 2000 can be found at: http://www.fdic.gov/bank/individual/failed/banklist.html

Table 1

Number of Bank Failures During and After the Great Recession

Year	Number of Bank Failures	Rate of Change from Previous Year
2007	3	n/a
2008	25	733%
2009	140	460%
2010	157	12%
2011	92	-41%
2012	17	-82%
Total	434	

Source: FDIC

In July of 2011, the FDIC released a study on core and brokered deposits. According to the study, a substantial number of banks that failed exhibited a common feature: the increased use of brokered deposits in the 12 quarters prior to failure (FDIC, 2011, p. 5). This thesis analyzes the relationship between the use of brokered deposits and bank failure based on Call Report data for December of 2011. A series of regressions will be tested in Stata® to accomplish this objective. This thesis will test the hypothesis that banks that obtain the majority of their funding from brokered deposits (primary users) are less likely to fail than those banks that utilize brokered deposits as a substitute for core deposits (secondary users). The FDIC study was mainly focused on secondary users posing the greatest risk to the Deposit Insurance Fund (DIF). The FDIC's conclusions on the role of brokered

deposits and bank failure were applied to all banks, regardless of their historical use of brokered deposits. This is an important factor to consider, since industrial banks (or industrial loan corporations) have historically relied on brokered deposits to fund a substantial portion of their banking operations.

2. THE BUSINESS OF BANKING

In Robert Glenn Hubbard's textbook "Money, the Financial System, and the Economy" (2008), the author provides an overview on the business of banking, including the regulatory environment and a discussion of moral hazard in banking. A summary of key banking terminology will be provided in this section.

In the United States, all banks use a balance sheet to provide a snapshot of their current financial condition. Banks that are supervised by the FDIC are required to submit quarterly Call Reports, which include a section with the following balance sheet items: assets, liabilities and net worth. Hubbard (2008) mentions that bank assets include "cash items, funds used in securities investments, loans and other asset holdings" (p. 281). Bank liabilities consist of "the funds the bank acquires from savers" (p. 279). This can include checkable deposits and borrowings from depositors (Hubbard, 2008, p. 281). The difference between assets and liabilities is the net worth of a bank. This component is made up of "the capital contributed by the bank's shareholders plus accumulated, retained profits" (Hubbard, 2008, p. 282). Consequently, a bank's net worth is dependent on the value of its assets and liabilities as they fluctuate over time.

All banks take inputs (deposits), add value to them, and create outputs (loans) from excess reserves in order to generate profits. Loans made to high risk

borrowers are more likely to reduce profits since the higher the number of loans that default, the more likely a bank is to fail. Therefore, in order to remain profitable in the long run, a bank must manage its loan portfolio to avoid making loans to risky borrowers (Hubbard, 2008, p. 283-285).

However, since the advent of deposit insurance in 1934, a moral hazard problem appeared. Since all FDIC insured banks guarantee certain deposits up to $250,000, depositors no longer have a strong incentive to monitor a bank's performance. That responsibility has shifted to the FDIC in the form of statutes, regulations, and regular bank examinations to insure the safety and soundness of FDIC insured banks (Hubbard, 2008, p. 314-315). Muslumov (2008) studied the role of full deposit insurance and moral hazard behavior in the Turkish banking system. The study showed that, under this regulatory environment, banks exhibit a higher incidence of excessive risk-taking while a lower capital adequacy ratio is maintained (Muslumov, 2008, p. 2162).

The moral hazard problem arises when banks accept greater levels of risk on FDIC insured deposits with the knowledge that in the event of bank failure, the FDIC would honor insured deposits. A possible solution to the moral hazard problem would consist of requiring banks to use their own capital to fund loans in combination with deposits from savers (Hubbard, 2008, p. 286). Currently, the FDIC controls for moral hazard issues by charging higher premiums on riskier deposits. This is intended to discourage banks from making loans to risky borrowers by increasing their costs of funds and effectively reducing expected profitability.

The FDIC is funded with premiums from insured banks and investments earnings (Hubbard, 2008, p. 318). The Deposit Insurance Fund (DIF) is used to cover costs associated with bank failures. The DIF can significantly decrease during recessions, but there are implicit guarantees from the Treasury Department and the Federal Reserve system to maintain the stability of the fund. The FDIC does not receive funds from the government unless the DIF is in distress. The premiums assessed to insured banks are determined on the capitalization status of each bank. According to Hubbard (2008), "in 2006 fees varied from $0.05 to $0.07 per $100 of insured deposits, according to how well-capitalized the bank was and whether bank examinations revealed any weakness" (p. 318). This means that, the higher the premiums, the higher the probability of bank failure.

In summary, banks make a profit when their earnings from lending are greater than their funding costs after providing a service to customers. The importance of banks as financial intermediaries cannot be understated given their key role in the health of an economy. Banks increase the efficiency of the financial system by matching savers and borrowers. Since banks specialize in gathering information about their borrowers, they are indeed reducing information costs, which encourage savings and, ultimately, greater levels of investment in the economy. The moral hazard problem exacerbates the need for bank monitoring and regulation to minimize bank failure. The DIF is directly affected by the rate of bank failures on deposits that are insured by the FDIC. The next section will introduce the Morris Plan banks as financial intermediaries that introduced innovation and, thus, greater competition in the financial services industry.

3. THE MORRIS PLAN BANKS OF THE 20TH CENTURY

Today's industrial banks[4] trace their roots to the Morris Plan banks of the early 20th century. A literature review on Morris Plan banks shows that, from inception, these financial intermediaries were subject to public scrutiny and a degree of controversy.

Robinson (1931) outlines how these financial intermediaries were formed and their innovative, yet peculiar methods, to raise capital at the time. Morris Plan banks started in the 1910s and provided financing to borrowers by:

> Lending money on endorsed notes at a high rate of interest with repayment by installments. The loan is discounted in advance at the legal rate of interest plus a commission or fee for the whole period that the loan runs, but the borrower starts to repay the loan the next week continuing to make a payment each week until the entire amount is repaid. (Robinson, 1931, p. 223)

The borrower was required to obtain the signatures of two acquaintances, whom guaranteed the good character of the borrower. This method of financing solved the adverse selection problem that commercial banks were facing at that time, which reduced the availability of personal loans to the general public. Since commercial banks required collateral from borrowers in order to obtain financing, many

[4] A full list of industrial banks can be found at the National Association of Industrial Banker's website: http://www.industrialbankers.org/wp-content/uploads/2010/02/NAIBFactBook2013.pdf

potential borrowers were excluded from mainstream banking (Ergungor & Thomson, 2005). Morris Plan banks filled this void by offering their loan products to consumers and, thus, corrected a market failure. The financing method of Morris Plan banks differed from the one used by commercial banks. In a personal loan from a commercial bank, monthly payments and simple interest were calculated during the life of the loan. On the other hand, Morris Plan banks charged an additional commission or fee.

Robinson (1931) mentioned that Morris Plan banks had three options to raise capital: 1. *Class B certificates*. These were sold directly to borrowers while applying for a loan. They usually paid a rate of 5% of savings. Morris Plan banks controlled the outflow of capital by limiting payment on a 30 day notice from the borrower. These certificates came to be known as thrift notes; 2. *Demand deposits*. A much cheaper option than Class B certificates but only available to state chartered banks; 3. *Collateral trust note*. Issued by the Industrial Finance Corporation. Funds were loaned to Morris Plan banks but they were not frequently used (Robinson, 1931, p. 223-225). It is important to highlight that, as indicated by Robinson (1931), "a noteworthy feature of the Morris Plan is the bid for savings" (p. 223). Therefore, the Class B certificates became the primary source of funding for Morris Plan banks due to their lower cost and wider availability.

Morris Plan banks continued to introduce innovation to the financial system by creating partnerships with retail establishments where "the store draws a Morris Plan retail trade acceptance upon the purchaser and this is accepted by the latter and endorsed by the former and then discounted at the Morris Plan bank. The rate

at which the Morris Plan company discounts the trade acceptance is the legal rate plus a service fee or commission" (Robinson, 1931, p. 225). Retail stores were then able to increase sales while meeting the needs of customers by partnering with Morris Plan banks. Additionally, Morris Plan banks showed remarkable flexibility and willingness to try new ways to finance consumers. This included the financing of automobiles, second mortgages, and even insurance plans (Robinson, 1931, p. 226).

As Morris Plan banks became more profitable, a monopoly concern was brought to court. One of the most notable cases being *David Stein vs. Arthur J. Morris, the Fidelity Corporation of America and the Industrial Finance Corporation* in 1914. In this case, David Stein demanded compensation due to copyright infringement on the business model used by the Morris Plan banks. The courts ruled against David Stein but indicated "that there are no peculiar features of the Morris Plan in which it has the right of sole ownership. Anyone may use them without paying for them" (Robinson, 1931, p. 228). This created a precedent that would eventually allow commercial banks to incorporate the Morris Plan bank innovations into their own line of business. The use of borrower references in commercial banking today can be traced back to the Morris Plan bank model (Mushinki & Ronnie, 2001).

In spite of their continued growth across the United States, Morris Plan banks struggled in some states to obtain a charter. They often faced regulatory challenges to the rate of interest charged to borrowers. The Uniform Small Loan Law of 1917 was opposed by Morris Plan banks for several reasons. The purpose of the law was

to curtail predatory lending, and it capped the interest rate at 42% per year (Robinson, 1931). As Robinson (1931) mentioned, this law "provides that interest must be figured on unpaid balances, and that no fees shall be charged other than those required for recording instruments" (p. 229). Since Morris Plan banks added a commission or fee to each loan aside from simple interest, this change in the law had a serious effect on their lending ability.

In some instances, Morris Plan banks were under scrutiny due to regulatory perceptions as to what exactly constituted a true bank. As Robinson (1931) stated, "Morris Plan concerns desire seemingly to be known as banks but they encounter difficulty when they seek to be incorporated under the general banking law of a state. Banking commissioners seem unwilling to regard the business of a Morris Plan company as a true banking business, and few of these concerns are now operating under the banking laws of the states in which they are located" (p. 229). The states were clearly divided on this issue, since some of them had strict usury laws or rules that disqualified Morris Plan banks from obtaining a state charter (Robinson, 1931).

In regards to annual interest rates charged by Morris Plan banks, Robinson (1931) mentioned that "When a note is discounted at 6 plus 2 or 8 per cent, and repaid under the terms of the Morris Plan, the actual interest is 19.2 per cent if account is taken of the money of which the borrower has had the full use during the year and of what it has actually cost him" (p. 233). This annual interest charge seemed outrageous at that time to many consumer groups. It is important to note that other financial intermediaries, like pawn brokers, charged anywhere between

12-120% per year (Robinson 1931). In the end, Robinson (1931) concluded that Morris Plan banks needed to show that they indeed were stable institutions. They could accomplish this by "proving how ill-adapted the usury laws are to the business of financing the credit needs of those without acceptable banking collateral" (p. 235). As Morris Plan banks decreased information costs to borrowers on the apparent usurious interest rate, their marginal position in the financial market could have improved. Ultimately, the decline of the Morris Plan banks as financial intermediaries was directly correlated with the recovery of commercial banking after the Great Depression, which resulted in the expansion of consumer credit and the growth of FDIC-insured demand deposits (Mushinki & Ronnie, 2001).

Even though only the Morris Plan Company of Terre Haute remains from the once prominent group of Morris Plan banks, the industrial banks of today face similar challenges to their existence as financial intermediaries. The next section will provide a background on the status of industrial banks today.

4. INDUSTRIAL BANKS TODAY

Industrial banks share a similar story to the one experienced by Morris Plan banks almost a century ago. Industrial banks have some options to raise capital: 1. *Brokered deposits*. A depositor obtains multiple savings accounts that are FDIC insured. The funds are loaned by brokerage houses to industrial banks, which then invest the money and repay the brokered deposit funds. Based on FDIC Call Report data for December of 2011, on average, brokered deposits make up a little more than half of the funding sources for industrial banks. 2. *TARP funds*. The Treasury Department set up the Trouble Asset Relief Program in 2008 as a way to provide liquidity to the money market during the Great Recession. These funds are auctioned off amongst both commercial and industrial banks. 3. *Time deposits*. These can take the form of Certificates of Deposit or NOW (Negotiable Order of Withdrawal) accounts (Ergungor & Thomson, 2005).

It is worth noting that industrial banks are not allowed to accept demand deposits. Demand deposits are the least expensive method to raise capital, due to little or no interest that is paid on checking accounts. Industrial banks, then, are at a disadvantage in terms of cost of funds when compared to commercial banks. This is because, in the case of brokered deposits, industrial banks must take into account the broker's fees in their pricing models.

In April of 2011, the Milken Institute released an extensive report on industrial banks, which included a list of the parent companies of industrial banks. Some of the current parent companies include BMW, Target, Toyota, and General Electric to name a few (Milken, 2011, p. 4). This goes on to show that, just like its Morris Plan bank predecessors, industrial banks provide financing in a variety of industries such as automotive, retail, and commercial. Lloyd (2009) mentioned that "only three particular assets are needed to enter the financial services market - capital, information technology, and distribution" (p. 217). A corporation may have access to capital, but without a distribution network, such as bank branches, their capacity to build a customer base is limited. This is the main reason why industrial banks are owned by corporations, for the sole purpose of expanding their own lines of business. Therefore, it is not surprising to see that Wal-Mart applied for an industrial bank charter in 2006. Wal-Mart expressed interest in obtaining an industrial bank charter in order to save on the costs of clearing transactions produced when consumers made payments. Due to monopoly concerns from commercial and community banks, Wal-Mart withdrew its industrial bank charter application, and the FDIC imposed a moratorium on approving more industrial bank charters (Lloyd, 2009).

Lloyd (2009) mentions the key concerns that surfaced when Wal-Mart applied for an industrial bank charter. The most prominent one was the FDIC's lack of regulatory power over the holding companies of industrial banks. Lloyd (2009) argues that as long as the FDIC has sufficient regulatory powers over those holding companies, the industrial banks do not pose a systemic risk to the banking system.

Since the separation of banking and commerce has been a prominent feature in the economic history of the United States, the growth of industrial banks will continue to be restricted in the near future. However, the Gramm-Leach-Bliley Financial Services Modernization Act of 1999 was a milestone in the ongoing liberalization of the banking sector (Hubbard, 2008, p. 327).

A more recent challenge that industrial banks currently face is related to the use of brokered deposits to fund new loans. On March 18, 2011, the FDIC held a roundtable on the issue of core and brokered deposits as part of a report mandated by Dodd-Frank. Core deposits consist mainly of demand deposits, such as checking and savings accounts, which a customer can request at any moment. Brokered deposits are those where savers split deposits into multiple accounts in different banks to obtain the full FDIC insurance amount on each deposit, usually by using a broker (Shaffer, 2010, p. 1). Banks that use core deposits rely on stable relationships with depositors to maintain a constant flow of funds and prevent bank runs. Also, holders of demand deposits do not receive much in terms of interest, while holders of brokered deposits receive a rate that is commensurate to the risk taken in the institution utilizing the brokered funds. Based on this definition of core and brokered deposits, it would appear that the use of brokered deposits would be associated with a higher likelihood of bank failure.

The roundtable discussion, held by the FDIC on March 18, 2011, provided a forum for bankers, government regulators, and academics, to discuss the subject of core and brokered deposits. Professor Haluk Unal from the University of Maryland stated that core deposits continue to be the safest way to raise capital, while

brokered deposits are tied to bank failure. Also, William Isaac of LECG Global Financial Services provided a brief history on brokered deposits that highlighted the crisis of the Savings and Loans associations in the 1980s, which necessitated a government bailout. Additionally, he explained how the FDIC had to place restrictions on brokerage houses that traded the brokered deposits in order to prevent them from spreading the depositor's money into different bank accounts, more commonly known as "pass-through" insurance. The United States Court of Appeals for the District of Columbia Circuit reversed the FDIC's regulation that eliminated "pass-through" insurance on brokered deposits (FDIC, 2011, p. 12). According to the Milken Institute, 21 industrial banks failed in the 1986-2003 period but none failed in the 2004-2009 period (Milken, 2011, p. 43). The key difference between the high number of failures before 2004, and the period of the Great Recession, is the existence of Section 29 of the Federal Deposit Insurance Act. The next section will explore this item in greater detail.

Shaffer (2010) developed a model to study the role of reciprocal brokered deposits and bank performance. Shaffer (2010) found "that banks using relatively more reciprocal brokered deposits face weaker market discipline and may take more risk in various dimensions. To the extent that those risks are not fully priced in the deposit insurance premium, such a conclusion suggests that a further risk premium may be warranted for reciprocal brokered deposits" (p. 5). This thesis will utilize a similar model with data on brokered deposits instead of reciprocal brokered deposits for the last quarter of 2011.

5. THE FDIC STUDY ON CORE AND BROKERED DEPOSITS

As stipulated in the Dodd-Frank Wall Street Reform and Consumer Protection Act of 2010, the FDIC was required to conduct a study on core deposits and brokered deposits. The study was released to the general public on July of 2011. The scope of the study included the following five areas:

> (1) the definition of core deposits for the purpose of calculating the deposit insurance premiums of banks; (2) the potential impact on the Deposit Insurance Fund of revising the definitions of brokered deposits and core deposits to better distinguish between them; (3) an assessment of the differences between core deposits and brokered deposits and their role in the economy and banking sector of the United States; (4) the potential stimulative effect on local economies of redefining core deposits; and (5) the competitive parity between large banks and community banks that could result from redefining core deposits. (FDIC, 2011, p.2)

The legislative implications of the FDIC study included the possibility of amending, or repealing, the current statute on brokered deposits as defined in Section 29 of the Federal Deposit Insurance Act (FDI Act). The FDIC (2011) study defines a brokered deposit as a "deposit accepted through a deposit broker" (p. 5). As stated in the FDI Act, a deposit broker is:

> (A) any person engaged in the business of placing deposits, or facilitating the placement of deposits, of third parties with insured depository institutions or the business of placing deposits with insured depository institutions for the purpose of selling interests in those deposits to third parties; and (B) an agent or trustee who establishes a deposit account to facilitate a business arrangement with an insured depository institution to use the proceeds of the account to fund a prearranged loan. (FDIC, 2011, p. 5)

Section 29 specifies the following restrictions on the use of brokered deposits:

> (1) Well capitalized banks may accept brokered deposits at any time; (2) adequately capitalized banks may accept new brokered deposits and renew or roll over existing brokered deposits if they have obtained a waiver from the FDIC; and (3) undercapitalized banks may never accept, renew, or roll over brokered deposits. (FDIC, 2011, p. 6-7)

The existing statute creates two limitations: a liquidity trap and industry stigma against brokered deposits. Should a bank become less than well capitalized, the statute's restrictions will worsen a bank's financial condition, since the use of brokered deposits would be restricted. Furthermore, the existence of the brokered deposit statute stigmatizes its use, since it is perceived as a riskier funding source, even for well capitalized banks. The FDIC has expressed concern over the use of brokered deposits. This is because banks are able to obtain funds that are fully insured by the FDIC without the traditional banking relationship with a customer (FDIC, 2011).

On the other hand, the FDIC considers core deposits safer, and more reliable, than brokered deposits (FDIC, 2011). Core deposits are defined as the sum of demand deposits (checking and savings accounts), all NOW (Negotiable Order of Withdrawal) and ATS (Automatic Transfer Service) accounts, MMDAs (Money Market Deposit Accounts), other savings deposits and time deposits under $250,000, minus all brokered deposits under $250,000 (FDIC, 2011, p.115). In contrast with the limitations on brokered deposits, there is no statute that limits the amount of core deposits that a bank may accept.

The FDIC study concluded that:

> As brokered deposit levels increase, the probability that a bank will fail also increases. Banks with higher levels of brokered deposits are also, in general, more costly to the DIF when they do fail. On average, brokered deposits are also correlated with higher levels of asset growth, higher levels of nonperforming loans, and a lower proportion of core deposit funding. All of these factors contribute to a higher likelihood of bank failure. Conversely, research shows that, generally, banks' increasing reliance on core deposits reduces the chance of failure and reduces the DIF's losses when banks do fail. (FDIC, 2011, p. 3)

The FDIC recommended that no changes to the brokered deposit statute of Section 29 be required at this time. This was a somewhat bittersweet outcome for industrial banks since the liquidity trap and overall stigma due to the use of brokered deposits remains. The banks that failed during the time period analyzed by the FDIC were not primary users of brokered deposits. Industrial banks have demonstrated a lower incidence of bank failure during the Great Recession, despite being primary users of brokered deposits. The next section will outline the model and results from a series of regressions that evaluate the performance of banks that use brokered deposits.

6. THE USE OF BROKERED DEPOSITS AND ITS RELATION TO BANK FAILURE

A review of the literature indicates that banks with high levels of loans to assets, and high delinquencies, are more likely to fail (Wheelock & Wilson, 2000). Additionally, core deposits are related to a higher charter value, which reduces losses in the event of bank failure (James, 1991). It is estimated that bank failures have an average cost of 10% of total assets (James, 1991). Consequently, a failed bank with a high concentration of brokered deposits will have a lower franchise value, which produces higher costs to the DIF (FDIC, 2011). When banks fail, the use of core deposits is associated with a higher franchise value. This is because core deposits are related to long standing customer relationships that present opportunities for growth for the acquiring bank. Franchise value in failed banks is heavily influenced by Section 29 of the FDI Act. Failed banks with high core deposits are preferred over those with brokered deposits, due to the industry stigma created by Section 29 of the FDI Act.

Industrial banks exhibit a high concentration of brokered deposit use, since they cannot accept demand deposits (Ergungor & Thomson, 2005). According to the econometric models used by the FDIC in the 2011 study, the use of brokered

deposits is associated with an increase in bank failures. Industrial banks are thus expected to fail more often, and to incur greater losses to the Deposit Insurance Fund (FDIC, 2011). However, no industrial banks failed in the 2007-2009 period, even though they are the primary users of brokered deposits.

6.1 Data and Methodology

The data sample uses information from the Call Reports submitted to the FDIC for the last quarter of 2011. There were a total of 6,789 banks that reported data during this Call Report period. Of those banks, 36 are industrial banks. None of the 17 banks that failed in the following period were industrial banks. The data for failed banks are based on their last Call Report before the FDIC was named receiver upon bank failure. The remaining 6,736 banks in the sample are active commercial banks. The totals for each group are provided in Table 2.

Table 2

Call Report Data Totals

Category	All Banks	Commercial Banks	Industrial Banks	Failed Banks
Count	6,789	6,736	36	17
Assets	$ 22,993,965,016	$ 22,845,861,141	$ 143,972,119	$ 4,131,756
Loans	$ 1,890,607,780	$ 1,815,161,737	$ 71,504,958	$ 3,941,085
Liabilities	$ 10,017,450,013	$ 9,892,793,271	$ 120,522,191	$ 4,134,551
Deposits	$ 8,096,105,969	$ 8,005,808,143	$ 90,300,621	$ (2,795)
Brokered Deposits	$ 544,932,154	$ 496,215,406	$ 45,658,904	$ 3,057,844
Equity Capital	$ 359,903,557	$ 342,584,453	$ 17,057,587	$ 261,517
Net Income	$ 113,875,403	$ 109,675,008	$ 4,473,349	$ (272,954)
Risk Based Capital	$ 344,156,074	$ 327,168,245	$ 16,972,193	$ 15,636
Brokered Deposits Ratio (BDR)	6.7%	6.2%	50.6%	-109404.1%
Return on Assets (ROA)	0.5%	0.5%	3.1%	-6.6%
Return on Equity (ROE)	31.6%	32.0%	26.2%	-104.4%
Loan to Assets Ratio (LA)	8.2%	7.9%	49.7%	95.4%
Capital to Assets Ratio (CAR)	1.6%	1.5%	11.8%	6.3%
Assets to Equity Ratio (LEV)	63.89	66.69	8.44	15.80
Assets to Brokered Deposits Ratio (BLEV)	2.84	2.85	1.59	-1478.27

Source: FDIC Call Reports for the last quarter of 2011

Table 2 shows that industrial banks, on average, use 51% of their total deposits as brokered deposits, compared to about 7% for the entire data sample. The return on assets (ROA) and return on equity (ROE) measures are particularly strong for industrial banks at 3% and 26%, compared to 0.5% and 32.0% for commercial banks, respectively. This strong performance is also reflected in the capital to assets ratio (CAR). It appears that industrial banks are much more capitalized at 11.8%, compared to 1.5% for commercial banks.

Another important figure is the leverage ratio. In the case of industrial banks, their leverage ratio is lower than average at 8.44, compared to 66.69 for all commercial banks. Failed banks had a leverage ratio of 15.60, which is much smaller than the national average at 63.89. This is not surprising since banks that will soon fail have low levels of equity. Also, it appears that aggregate liquidity in the form of high leverage ratios, increases during expansionary periods in the business cycle (Adrian & Shin, 2010). According to Adrian and Shin (2010), during a business expansion "the financial intermediaries then hold surplus capital and they will attempt to find ways in which they can employ their surplus capital. In analogy with manufacturing firms, we may see the financial system as having surplus capacity" (pp. 37-38). When banks have higher leverage ratios, they are more inclined to lend more aggressively. This has the effect of lowering profitability, as adverse selection occurs when loans are given to even riskier borrowers over time (Adrian & Shin, 2010). Since industrial banks are not as leveraged as commercial banks, this would help explain the absence of bank failures by industrial banks during the Great Recession.

Table 3 provides a description of each variable, as well as the expected coefficient sign for each measure. A positive sign indicates a higher probability of bank failure. The regression equation is modeled as follows[5]:

$$fb = \alpha + \beta 1roa + \beta 2roe + \beta 3la + \beta 4car + \beta 5lev + \beta 6blev + \beta 7bdr + \beta 8ib + \epsilon$$

Since industrial banks are the primary users of brokered deposits, the regression results can shed light on the current perception of core deposits as safer than brokered deposits. However, since the data set is limited to a single Call Report period, the results are only preliminary. Thus, it is unclear if industrial banks are stable due to the use of brokered deposits, or alternatively, due to the existence of regulation on brokered deposits.

Table 3

Expected Regression Coefficient Signs for All Model Variables

Variable	Description	Expected Sign
fb	Failed Bank	Intercept
roa	Equity to Assets Ratio (Return on Assets)	Negative
roe	Net Income to Assets Ratio (Return on Equity)	Negative
la	Loans to Assets Ratio	Positive
car	Capital to Assets Ratio	Negative
lev	Assets to Equity Ratio (Leverage)	Positive
blev	Assets to Brokered Deposits Ratio	Negative
bdr	Brokered Deposits to Total Deposits Ratio	Negative
ib	Industrial Bank	Negative

Notes: the ib variable is a dummy variable to test the correlation of industrial banks and likelihood of bank failure

[5] The derivation of the statistical methods used in this thesis can be found in Woolridge 2009: 225-299.

6.2 Results

Using Stata® software, the summary statistics shown in Table 4 were generated to show the range of values used in the regression. The maximum value of the assets to brokered deposits ratio (BLEV) variable is related to the high occurrence of brokered deposits in failed banks (see Table 2). The minimum value of the net income to assets ratio (ROE) variable is related to failed banks with negative equity. The low incidence of brokered deposit use in the sample is visible in the mean value of the brokered deposits to total deposits ratio (BDR) variable at 3%. The maximum value of the capital to assets ratio (CAR) variable shows how some banks can cover all loans with capital while the average capital amount is 12% for all banks. The loans to assets ratio (LA) variable results show that at least one bank in the sample is using 98% of its assets as loans. Since a high LA ratio is associated with a higher likelihood of default, the relation between the LA and BDR variables will be further analyzed.

Table 4

Summary Statistics of Sample Data

Variable	Mean	Std. Dev.	Min	Max
fb	0	0.04	0	1
roa	0.01	0.02	-0.19	0.84
roe	0.02	0.44	-16.99	5.09
la	0.58	0.18	0	0.98
car	0.12	0.09	-0.08	1
lev	10.12	8.5	-39.53	299.98
blev	267.74	11922.32	0	972518.5
bdr	0.03	0.08	0	1
ib	0.01	0.07	0	1

Notes: n= 6,789

As shown in Figure 1, there is a strong concentration of financial institutions with high LA ratios and low BDR ratios. Since a high LA ratio is associated with a higher probability of failure, it appears that industrial banks are less likely to fail, since they have low LA ratios in general. A basic correlation of the LA and BDR variables shows a weak positive relationship between asset growth and use of brokered deposits. The correlation value is 0.12. It appears that the use of brokered deposits is not the driving force of growth for financial institutions in the sample analyzed. This provides evidence against the claims in the FDIC study that the use of brokered deposits is associated with strong loan growth followed by high delinquencies.

Three linear regressions were generated to test the correlation between failed banks to each variable shown in Table 5. In the first two regressions, the R-squared value indicates that only 31% of the variation between the independent and dependent variables can be explained with this data sample. The first regression showed that a majority of variables were statistically significant at the 95% confidence interval. The only two exceptions were the BLEV and industrial bank (IB) variables. The robust regression was generated to account for Heteroskedasticity issues in the original regression. After the robust regression was generated, the number of statistically significant variables was reduced from six (ROA, ROE, LA, CAR, LEV, BDR) to four (LA, CAR, LEV and BLEV). The BLEV variable became statistically significant when the robust regression was generated, while the ROE variable lost statistical significance.

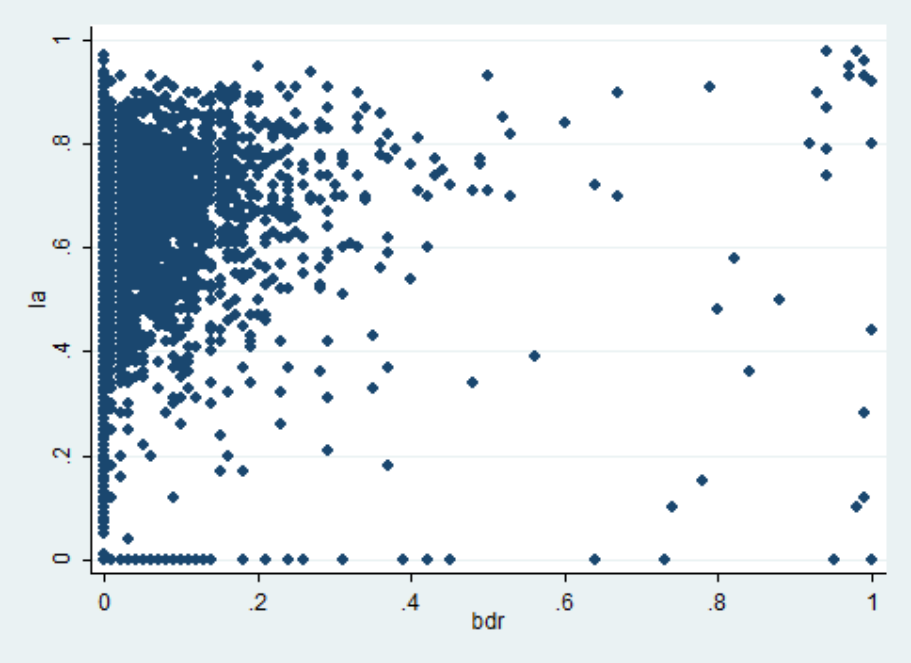

Figure 1. Scatterplot of Loans to Assets and Brokered Deposits Ratio

Table 5

Regression Results

Variable	β (OLS)[a]	β (OLS Robust)[b]	β (Logit)[c]
roa	-0.085*	-0.085	-2.3256
roe	0.0085*	0.0085	0.2277
la	-0.0166*	-0.0166*	6.2692
car	0.0453*	0.0453*	-80.9291
lev	0.0033*	0.0033*	0.0441
blev	0	0*	-0.0283
bdr	0.0189*	0.0189	4.2141
ib	0.0041	0.0041	(omitted)

*Notes: [a] R^2 = 0.31. [b] R^2 = 0.31. [c] Pseudo R^2 = 0.80. * p < .05. n=6,789*

The coefficient sign of the LA variable did not match the expected sign indicated in Table 3. It appears that the higher the percentage of loans to assets, the lower the probability of bank failure. This is a surprising result, considering that loan growth is associated with higher exposure to adverse selection, which can produce more delinquencies in the long run. The coefficient of the CAR variable appears to support the findings of Adrian and Shin (2010), where higher concentrations of capital lead to more aggressive lending in order to utilize the available capital surplus. Banks with higher concentrations of capital are 4% more likely to fail.

The statistical significance of the assets to equity (LEV) variable indicates that banks with higher leverage of assets to equity are more likely to fail. However, the low coefficient value does not appear to have a practical significance. The BLEV variable is correlated with a higher incidence of bank failure. Since this variable is related to the use brokered deposits, and considering that the LEV variable is also statistically significant, there is evidence against the hypothesis that the use of brokered deposits is not related to bank failure. In other words, there is evidence that the use of brokered deposits is related to bank failure. Since industrial banks are primary users of brokered deposits, it appears that an increase in the use of brokered deposits, relative to assets, is associated with a higher likelihood of bank failure.

Finally, when the logistic regression was performed, Stata® dropped the IB variable. Since no industrial bank failed during the last quarter of 2011, there is no

evidence that industrial banks can fail in the data used. However, even without the IB variable, all variables in the sample where statistically insignificant.

7. CONCLUSION

Based on the regression results, all other things equal, a higher use of brokered deposits, relative to overall assets, is associated with a higher likelihood of bank failure. Since industrial banks fund a majority of their loans with brokered deposits, the conclusion is that the use of brokered deposits appears to be related to riskier loans with the potential to increase bank failures. However, the lack of bank failures in industrial banks during the Great Recession provides evidence of the effectiveness of Section 29 of the Federal Deposit Insurance Act. Before the enactment of Section 29, a high concentration of industrial banks failed during the Savings and Loans crisis of the 1980's.

The funding restrictions imposed by Section 29 appear to act as a deterrent for industrial banks to engage in risky lending practices. Industrial banks must ensure that they remain properly capitalized while not using surplus capital to make risky loans. The surplus capital can be used, instead, to better understand customers and, thus, reduce adverse selection problems. The potential legislative effect of these findings could be applied to core deposits as well. The current perception that core deposits are preferred to brokered deposits may be misguided. Based on the experience of industrial banks, it is possible to remain profitable even in the context of strict regulation in the form of Section 29. Since industrial banks

have clear knowledge of the consequences of being less than well capitalized, the correct incentives are in place to reduce bank failures. The moral hazard issue that caused many of the bank failures during the Great Recession can be minimized with additional regulation that discourages banks from becoming too big to fail.

Finally, the particular type of deposit used by a bank, core or brokered, may not necessarily correlate with a higher or lower incidence of bank failure. In fact, the regulatory environment can have an even greater effect in promoting the correct incentives when using either type of deposit.

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